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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/588,233	03/01/2007	Masahide Matsuura	293007US0PCT	5425

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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.
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ALEXANDRIA, VA 22314

EXAMINER

RALEIGH, DONALD L

ART UNIT	PAPER NUMBER
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2879

NOTIFICATION DATE	DELIVERY MODE
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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/588,233	Applicant(s) MATSUURA ET AL.	
	Examiner DONALD L. RALEIGH	Art Unit 2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>08/03/2008, 01/05/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adachi et al (US PG Pub. No. 2002/0113545) in view of Shiang et al (US PG Pub. No. 2005/0260439) and further in view of Forrest et al (US Patent No. 7,061,011).

Regarding Claim 1, Adachi discloses, at least in Figure 6, an organic electroluminescent device (abstract line1 (OLED)) having a structure in which at least an emitting layer (613) and an electron-transporting layer (613)(Paragraph [0033] lines 5-6 teaches that the electron transport layer also functions as an emitting layer) are stacked between an anode (611) and a cathode (614)(see Figure 6) , the emitting layer containing an organic metal complex (Paragraph 0004], lines 9-10) .

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Adachi fails to disclose wherein a difference (ΔAF) in electron affinity between a main organic material forming the emitting layer and a main material forming the electron-transporting layer satisfies the following expression; " $0.2 \text{ eV} \leq \Delta AF \leq 0.65 \text{ eV}$ ".

Forrest teaches in Column 1, lines 25-26 using an OLED . Also, in Column 6, lines 53-55, Forrest teaches an emissive layer (135) that may include an organic material capable of emitting light. Furthermore, Column 6, lines 59-62 teaches that it may, in addition, contain electron transport material. Column 2, lines 32-35 teaches that the electron affinity between the two organic materials should be within 0.4 eV and preferably within about 0.2 eV which places it in the required range.

Adachi fails to disclose that a heavy metal is used as a central metal.

In the same field of endeavor, Shiang teaches in Paragraph [0043] lines 1-7 using a heavy metal in the organic emitting materials to allow for more efficient transfer and harvest of the triplet energy state.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to incorporate the heavy metal complex as taught by Shiang into the OLED of Adachi, as modified by Forrest, to allow for more efficient transfer and harvest of the triplet energy state.

Regarding Claim 2, Adachi, as modified by Forrest, fails to exemplify the organic electroluminescent device which emits electroluminescence at a longer wavelength than the wavelength corresponding to the triplet energy gap

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($E_g^T(\text{Dopant})$) of the organic metal complex having a heavy metal as a central metal.

In the same field of endeavor, Shiang teaches in Paragraph [0043], lines 1-7 using a heavy metal in the organic emission materials. Also, Shiang teaches that the emissions of the organic materials are in the red emitting region (long wavelengths) and that the emissions with the heavy metal doping will include emissions from the triplet state in order to allow for more efficient transfer and harvest of the blue emitting material. (blue light range, triplet energy range = shorter wavelength).

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to incorporate the heavy metal as taught by Shiang into the shorter wavelength material of the electroluminescent layer of Adachi, as modified by Forrest, in order to allow for more efficient transfer and harvest of the triplet energy state of the blue emitting material.

Regarding Claim 3, Adachi, as modified by Forrest, fails to exemplify an organic electroluminescent device wherein the electroluminescence at a longer wavelength than the wavelength corresponding to the triplet energy gap ($E_g^T(\text{Dopant})$) of the organic metal complex having a heavy metal as a central metal is a main component of electroluminescence emitted from the device.

Shiang teaches in Paragraph [0043], lines 1-7 that the organic material of the emission layer is red emitting (longer wavelength) indicating that the red emitting material is the main component of electroluminescence and further that

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the doping of heavy metal (triplet energy dopant) is only 200 parts per million, indicating that it is a minor component of the electroluminescent material.

Furthermore, Shiang uses this combination to allow for more efficient transfer and harvest of the triplet state energy of the blue emitting material.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to incorporate the components as taught by Shiang into the device of Adachi, as modified by Forrest, to allow for more efficient transfer and harvest of the triplet state energy of the blue emitting material.

Regarding Claim 4, Adachi discloses, at least in Figure 6, the organic electroluminescent device wherein the main organic material forming the emitting layer has an electron transporting property. (Paragraph [0033], lines 5-6).

Claims 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adachi in view of Forrest and Shiang and further in view of Kondakova et al (US PG Pub. No. 2005/0123797)..

Regarding Claim 5, Adachi, as modified by Forrest, fails to exemplify an organic electroluminescent device wherein the triplet energy gap ($E_g^T(\text{Host})$) of the main organic material forming the emitting layer is 2.52 eV or more.

In the same field of endeavor, Shiang teaches in Paragraph [0029], lines 1-12, an organic EL layer (line 1) that electroluminesces either in the blue or red region. (line 12).

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Furthermore, Kondakova teaches in Column 7, lines 8-9 that the triplet energy of a blue phosphorescent material can be as low as 2.8 eV (i.e. more than 2.52 eV).

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to incorporate the organic layer as taught by Shiang into the device of Adachi, as modified by Forrest, in order to emit blue light which Kondakova teaches inherently has a triplet energy of more than 2.52 eV.

Regarding Claim 7, Adachi, as modified by Shiang and Forrest, fails to exemplify the organic electroluminescent device wherein the triplet energy gap ($E_g^T(\text{Host})$) of the main organic material forming the emitting layer is equal to or greater the triplet energy gap ($E_g^T(\text{Dopant})$) of the organic metal complex having a heavy metal as a central metal.

In the same field of endeavor, Kondakova teaches in Paragraph [0014], lines 1-8, an electroluminescent device (line 1) wherein the triplet energy gap of the main organic material (phosphorescent guest material, line 7) is more than the triplet energy gap of the organic metal complex (efficiency enhancing material). (Paragraph [0015], lines 4-7 teaches that the light emitting layer includes an organometallic compound including a heavy metal (platinum or iridium)) in order to provide a light source having two different wavelength ranges (Paragraph [0021], lines 1-3).

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to incorporate the energy gap differences as taught by Kondakova

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into the OLED device of Adachi, as modified by Shiang and Forrest, in order to provide a light source having two different wavelength ranges.

Allowable Subject Matter

Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance.

Regarding Claim 6, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in Claim 6, and specifically comprising the limitation of an "organic electroluminescent device wherein the triplet energy gap ($E_g^T(\text{Dopant})$) of the organic metal complex having a heavy metal as a central metal is equal to or greater than the triplet energy gap ($E_g^T(\text{ETL})$) of the main material forming the electron-transporting layer."

Furthermore, prior art of record teaches the reverse of applicant's claim, that the triplet energy gap of the host (ETL) should be more than the triplet energy gap of the dopant, in order to have an efficient transfer of electrons from host to dopant.

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Conclusion

Examiner's note: Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DONALD L. RALEIGH whose telephone number is (571)270-3407. The examiner can normally be reached on Monday-Friday 7:30AM to 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Donald L Raleigh/
Examiner, Art Unit 2879

/Nimeshkumar Patel/
Supervisory Patent Examiner, Art Unit 2879